

REMARKS

Claims 1-26 are now pending in the application. The specification has been amended herein to recite the correct indicia for the rubber connector. Claims 21-26 have been added herein. Support for new Claims 21-23 can be found at least in Figure 3 of the present application. Support for new Claim 24 can be found at least in Figures 8(A), 8(B), 12(A) and 12(B) of the present application. New Claim 25 is similar to objected to Claim 12. Support for new Claim 26 can be found at least in Figures 12(A) and 12(B) of the present application. No new matter has been added. The Examiner is respectfully requested to reconsider and withdraw the rejections in view of the remarks contained herein.

REJECTION UNDER 35 U.S.C. § 103

Claims 1-3, 4-11 and 15-20 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over applicant admitted prior art (AAPA) in view of Kawaguchi et al. (JP Pat. Publication No. 04-020933 A). This rejection is respectfully traversed.

Referring to Claim 1, an electrooptical unit is recited and calls for "a flexible board overlapping part of said electrooptical panel." Similarly, Claim 18 recites an electrooptical unit and calls for "a flexible board disposed on said electrooptical panel." In rejecting Claims 1 and 18, the Office Action relies upon AAPA as differing from the claimed invention because "it does not explicitly disclose the flexible board that overlaps part of the electrooptical panel and includes a plurality of front-side terminals that are electrically connected with electrical components and rear side terminals that are electrically connected with the panel-side terminals via conductive member." It is respectfully submitted that the AAPA differs from the claimed invention not only as

recited in the Office Action, but also because no flexible board is disclosed in the AAPA as called for in the claims.

The Office Action then relies upon the Kawaguchi et al. reference as providing a reason, suggestion or motivation to combine the flexible board disclosed therein with the AAPA so that workability is improved. It is respectfully submitted, however, that the Kawaguchi et al. reference is completely unconcerned with the problems solved by Applicant's invention and, thus, does not provide any teaching, suggestion or motivation to arrive at the limitations called for in Claims 1 and 18. Applicant's representative encloses herewith a partial translation of the Kawaguchi et al. reference for the Examiner's use in evaluating the teachings therein.

The present invention is concerned with overcoming large contact resistance and large unevenness in film thickness in films which form terminals in a liquid crystal panel that are used to electrically connect the liquid crystal panel to an electronic component(s). The large contact resistance can cause varying circuit constants to occur. Additionally, the large contact resistance can also increase over time which may cause problems such as the panel not illuminating or illuminating dimly. The use of a flexible board as called for in the claims avoids the problems of unevenness in film thickness and large contact resistance. See at least Paragraphs [0007] to [0009] and [0015] of Applicant's Specification.

In contrast, the Kawaguchi et al. reference is completely unconcerned with the problems associated with unevenness in film thickness and large contact resistance. Rather, the Kawaguchi et al. reference teaches and discloses the use of a plurality of discrete flexible printed circuit boards each containing a discrete IC chip and each

having one of the left and right input terminals 3 provided on the front surface and the other provided on the rear surface so that adjacent circuit boards can be connected to each other by overlapping left and right terminals of adjacent circuit boards. This facilitates the connection of the flexible circuit boards to each other and makes it sufficient to merely replace the corresponding flexible printed circuit boards. The motivation for producing such individual flexible printed circuit boards with individual IC chips is to reduce the man hours required to fix a defective IC chip by enabling the single defective IC chip to be easily removed and replaced without requiring that each replacement IC chip be connected separately after aligning it with the other wiring on the flexible board. This configuration thus provides improved economy and workability in the case of replacing IC chips. See the Abstract, the enclosed partial translation, and Figures 1 and 2 of the Kawaguchi et al. reference. Thus, the Kawaguchi et al. reference is concerned with a reduction in the man hours needed to replace a defective IC chip and does not provide a teaching, suggestion nor motivation to position a flexible board in contact with components of an electrooptical unit as called for in Claims 1 and 18. In fact, the teachings of the Kawaguchi et al. reference are entirely different and unrelated to the present invention.

With the Kawaguchi et al. reference providing no teaching, suggestion or motivation to use a flexible board as called for in Claims 1 and 18, it is respectfully submitted that Claims 1 and 18 are non-obvious and patentable over AAPA in view of Kawaguchi et al. Claims 2-17 and 21 all depend from Claim 1 and, therefore, for at least the reasons stated above with reference to Claim 1 are also patentable. Claims 19, 20 and 22 all depend from Claim 18 and, therefore, for at least the reasons stated

above with reference to Claim 18 are also patentable. Accordingly, withdrawal of the instant rejections is requested.

Referring now to Claim 2, the claim calls for “wherein an area of said flexible board with said through holes overlaps said electrooptical panel.” Similarly, Claim 3 calls for “wherein all of said flexible board overlaps said electrooptical panel.” In contrast, the AAPA lacks any disclosure of the use of a flexible board and, further, the Kawaguchi et al. reference does not disclose through holes in the flexible board overlapping an electrooptical panel, much less all of the flexible board overlapping the electrooptical panel as called for in Claims 2 and 3. In fact, the Kawaguchi et al. reference teaches away from this positional relationship by clearly showing that the through holes 5 are spaced apart from the electrooptical panel 6. See Figures 1 and 2 of the Kawaguchi et al. reference. Thus, it is respectfully submitted that there is no teaching, suggestion nor motivation provided in the prior art to arrive at the electrooptical units called for in Claims 2 and 3. Accordingly, withdrawal of the instant rejection is requested.

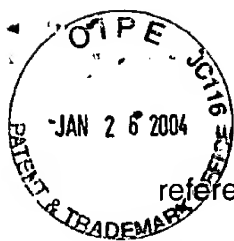
Referring now to new Claim 21, the claim recites “wherein the electrooptical panel, the flexible board, and the electronic component have a common overlapping region.” Similarly, new Claim 22 calls for “wherein the electrooptical panel, the flexible board, and the electronic component have a common overlapping region.” Also similarly, new Claim 23 calls for “the electrooptical panel, the flexible board, and the electronic component having a common overlapping region.” In contrast, neither the AAPA nor the Kawaguchi et al. reference teaches or suggests a flexible board that overlaps both an electrooptical panel and an electronic component in a common region

as called for in Claims 21-23. Therefore, it is respectfully submitted that for at least this reason, Claims 21-23 are patentable over the prior art of record and allowance of Claims 21-23 is requested.

Referring now to new Claim 24, an electrooptical unit is recited and calls for “the first terminals and the second terminals being electrically interconnected through the through holes and overlapping each other as viewed in plan.” It is respectfully submitted that neither the AAPA nor the Kawaguchi et al. reference disclose, teach or suggest an electrooptical unit as called for in Claim 24. Rather, the AAPA is silent about the use of any type of flexible board. Additionally, the Kawaguchi et al. reference teaches away from an electrooptical unit as called for in Claim 24. Specifically, the Kawaguchi et al. reference discloses the input and output terminals 3, 4 being located on different edges of the circuit board 7 and, thus, do not overlap. See the enclosed partial translation and Figures 1 and 2 of the Kawaguchi et al. reference. Accordingly, it is respectfully submitted that Claim 24 is patentable over the prior art of record and allowance of Claim 24 is requested.

Referring now to new Claim 25, an electrooptical unit is recited and calls for “the first terminals being formed at a wider pitch than a pitch of the panel terminals.” Thus, Claim 25 is similar to objected to Claim 12. Accordingly, it is respectfully submitted that Claim 25 is patentable over the prior art of record and allowance of Claim 25 is requested.

Referring now to new Claim 26, an electrooptical unit is recited and calls for “each first terminal being formed wider than the corresponding one of the second terminals.” It is respectfully submitted that neither the AAPA nor the Kawaguchi et al.



reference disclose, teach or suggest an electrooptical unit having a flexible board with the first and second terminals configured as called for in Claim 26. Thus, it is believed that Claim 26 is patentable over the prior art of record and allowance of Claim 26 is requested.

ALLOWABLE SUBJECT MATTER

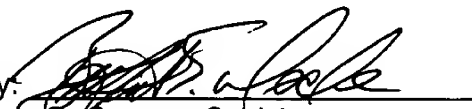
The Examiner states that Claims 12 and 13 would be allowable if rewritten in independent form. Applicant's representative respectfully thanks the Examiner for the careful consideration of Claims 12 and 13.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant's representative therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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Translation of [Prior Art], [Problems to be overcome by the Invention],
and [Embodiment] sections of JP 04-020933 A (Kawaguchi)

[Prior Art]

An early configuration for mounting a driver (IC) for driving a liquid crystal display device includes a combination of TAB (Tape Automated Bonding) 9 and a print circuit board 10 such as shown in Fig. 3. Subsequently a method such as in Japanese patent application publication No. S63-104078 was proposed as a method that uses a small mounting area and that facilitates replacement of defective drivers. In this method, as shown in schematic Fig. 4, a plurality of device driving IC chips 1 are disposed on a single flexible board 7. Wiring between the IC chips is also on the flexible board. As a result, the surface area for mounting the drivers can be made smaller. Also, if one of the ICs becomes defective, then a flexible board that was prepared beforehand for repair purposes can be disposed. This reduces time required to replace ICs.

[Problems to be overcome by the Invention]

However, insufficient attention is paid regarding IC replacement in the case when an IC mounted using the above-described conventional technology becomes defective. Therefore, when a single IC of the ICs disposed on the single flexible board becomes defective, even though it is possible to replace only the defective IC, the replacement requires that each replacement IC be connected separately after aligning them with the other wiring on the flexible board. This has a problem in that it is troublesome and expensive.

It is an object of the present invention to overcome the problems in the above-described prior art, and to provide a liquid crystal display device having an IC-print circuit board connection with improved economy and workability in the case of replacing ICs.

[Embodiment]

Next, a concrete explanation of the liquid crystal display device according to the present invention will be provided using an embodiment.

Fig. 1 is a view showing configuration of an embodiment of a flexible print circuit board provided for each IC chip, and shows that an IC mounted flexible print circuit board includes IC input terminals 3, IC output terminals 4, through holes 5, and an IC chip 1, which is provided on a flexible print circuit board 2. Here, the input terminals 3 are provided on left and right sides, and left- and right-side terminals 3 of adjacent print circuit boards can be connected so that a through condition can be achieved. Input to the IC chip 1 is performed using the through holes 5. The output terminals 4 are used as terminals for connecting to terminals of the liquid crystal display in the same manner as TAB. It should be noted that in order to facilitate connection of the flexible print circuit boards to each other, one

of the left and right input terminals 3 is provided on the front surface and the other is provided on the rear surface so that adjacent circuit boards can be connected to each other by overlapping left and right terminals of adjacent circuit boards.

Fig. 2 is a view showing an example of the IC mounted flexible print circuit board of Fig. 1 mounted on a liquid crystal display element (LCD). 6 is an LCD and 8 is a connection portion between separate IC mounted flexible print circuit boards 7. With this configuration, one IC chip is mounted on each single flexible print circuit board. Therefore, if an IC becomes defective, it is sufficient to merely replace the corresponding flexible print circuit board. Therefore, the number of operations can be reduced. Also, by enabling direct connection between IC mounted flexible print circuit boards 7, there is no need to prepare a separate print board as in the conventional situation.